

Weather Functional Projects

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W01–Aviation Surface Weather Observation Network (ASWON)

Program Description: This program was established to improve and expand surface weather observations to:

- Improve the weather picture for pilots, operators, and air traffic personnel
- Reduce the cost associated with weather data collection and processing
- Provide weather data at unmanned locations
- Meet growing demands.

Original Program. This project has installed and commissioned 198 automated weather observing systems (AWOS). AWOS provides automated surface observations at 198 airports; approximately one-fourth are in Alaska. In partnership with the National Weather Service and the Department of Defense, the FAA has installed 569 automated surface observing systems (ASOS) at airports. ASOS provides consistent surface weather observations over the entire United States.

This project also installed and commissioned 22 AWOS data acquisition systems (ADAS). Located at each air route traffic control center (ARTCC) and the air traffic control system command center (ATC-SCC), each ADAS collects surface weather information from selected ASOS/AWOS sites and disseminates it to air traffic controllers, traffic managers, and other NAS weather data users. Remote maintenance monitoring systems track the performance of each weather observing element.

Current Program. This project expands/enhances the current weather observation network by providing additional weather observing and data collection systems, preplanned product improvements, and data display systems.

The ASWON is a collection of manual and automated surface weather observing equipment and related data collection and display systems that generate reports of local airport surface weather conditions for pilots, air traffic controllers, airline dispatchers, and the national weather data collection network. Pilot knowledge of local weather conditions at arrival and departure points is essential to safe flight operations.

The ASWON is an evolving system; as new technology becomes available and cost-effective, it is incorporated into the ASWON through the FAA acquisition management system (AMS) process. The ASWON consists of:

- Automated weather systems (AWOS/ASOS)
- Automated Weather Observing System Data Acquisition System (ADAS)
- Data display systems (ASOS controller equipment (ACE))
- Aviation weather sensors, including:
 - F420 wind sensors
 - Manual sling psychrometers.

ASWON plans include:

- *Automated weather stations.* As additional sites are evaluated and approved for automated weather equipment using approved siting criteria, additional automated systems will be added. In FY 1998, a requirement for 30 additional systems was identified and funded by Congress. The FAA will also develop improved weather sensors and algorithms for existing AWOS and ASOS systems. In the near term (FY 2001), a program to upgrade or replace aging AWOS units will be initiated.
- *AWOS/ASOS data acquisition system.* An upgrade to ADAS (ADAS UP-1) is planned to begin in the midterm (around FY 2005).
- *Data display systems:* Current weather operational display systems at many airport sites will be replaced.
- *Manual weather observing equipment.* Plans include providing an integrated suite of stand-alone sensors equipment, termed the Stand-Alone Weather System (SAWS)—to be installed at 400 towered airports.

Products:

- 198 Automated Weather Observing Systems (Inservice Management)
- 569 Automated Surface Observing Systems (Solution Implementation)
- 30 automated weather sensing systems (Inservice Management)
- 25 AWOS Data Acquisition Systems (Inservice Management)
- AWOS replacement systems (in mission analysis)
- ADAS upgrades (in mission analysis)
- ACE data display systems (Inservice Management)

- ACE upgrade (in development)
- Various manual weather sensors (Inservice Management)
- SAWS sensor equipment (in solution implementation)
- Automated observation visibility and cloud cover (AOVCC) prototype for proof of concept demonstration (ASOS product improvements; in mission analysis).

Accomplishments (1/97–9/98):

- Commissioned remaining AWOS's
- Commissioned all ADAS's
- Installed all remaining ASOS's and commissioned 352 to date
- Certified ASOS, AWOS, ACE, and ADAS as year-2000 compliant

Sponsor Organization:

- ARW-1, Air Traffic System Requirements Service, Aviation Weather Directorate.

Performing Organization:

- AUA-430, Weather Sensors Product Team, IPT for Weather and Flight Service Systems.

Contractors:

- SMI Corporation (ASOS)
Hunt Valley, Md.
- Qualimetrics Corporation (AWOS)
Sacramento, Calif.
- Comm Power Corporation (ADAS)
Camarillo, Calif.
- DME Corporation (ADAS/ALDARS)
Orlando, Fla.

Schedule: W01 - Aviation Surface Weather Observation Network (ASWON)

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
	<ul style="list-style-type: none"> • MNS 250 Approved AWOS <ul style="list-style-type: none"> • First ORD (40-Unit Option) • Last ORD (Initial 150 Units) 																		
			ASOS <ul style="list-style-type: none"> • First ORD 				<ul style="list-style-type: none"> • Last ORD (40 Unit Option) 												
							<ul style="list-style-type: none"> • 200th ORD • 350th ORD • 450th ORD • 539th ORD • Last ORD 												
					ADAS <ul style="list-style-type: none"> • First ORD • Last ORD 														
							ASOS Product Improvements <ul style="list-style-type: none"> • AOVCC Contract Award (11/98) 												

W02–Weather Radar Program

Program Description: This is the 15th year of a tri-agency effort by the Departments of Commerce, Transportation, and Defense to provide a national network of next-generation weather radars (NEXRAD) that detect, process, distribute, and display hazardous and routine weather information. The FAA's contributions under this program are the cost share funding of the entire system and acquisition and installation of 12 NEXRAD radars in Alaska,

Hawaii, and Puerto Rico. These remote locations required modifications, such as power-conditioning systems, lightning grounding, bonding, shielding, and remote maintenance monitoring modules unique to the FAA.

NEXRAD Enhancements. A triagency operational support facility (OSF) has been established in Norman, Okla., and is responsible for system modifications, enhancements, and product improvements to

the network. OSF also provides such services as software maintenance, problem resolution, and configuration management.

OSF has implemented new software algorithms to alleviate anomalous propagation problems. Efforts are also underway to enhance algorithms that will improve the detection capability of aviation weather hazards and will be installed in future NEXRAD Builds. These enhancements will improve the effectiveness of NEXRAD data for aviation users and extend the data's useful life.

Also planned are sequential upgrades to the NEXRAD radar product generator (RPG) processor and the radar data acquisition (RDA) unit. This upgrade will consist of reconfiguring the RPG and RDA to a state-of-the-art, open-system architecture. The upgrade will replace the existing computer system to increase processing capacity and improve logistics supportability.

Products:

- 164 NEXRAD systems
 - 120 National Weather Service
 - 26 Department of Defense
 - 12 FAA

– Six support systems

- 25 principal user processors for ARTCC's, Combined En Route and Radar Approach Control Centers (continental and offshore), and the Air Traffic Control System Command Center (ATC-SCC)
- Algorithm enhancements
- Radar product generator processor and data acquisition unit upgrades.

Accomplishments (1/97–9/98):

- Commissioned 11 of 12 total FAA NEXRAD's
- Completed FAA unique UPS/generator modifications at seven sites.

Sponsor Organization:

- ARW-1, Air Traffic System Requirements Service, Aviation Weather Directorate.

Performing Organization:

- AND-440, En Route Surveillance Product Team, IPT for Surveillance.

Contractors:

- Lockheed Martin Corporation
Great Neck, N.Y.

Schedule: W02 - Weather Radar Program

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
<ul style="list-style-type: none"> • MNS 262 Approved 																			

W03–Terminal Doppler Weather Radar (TDWR) System

Program Description: Windshear, an abrupt change in wind direction and/or velocity that may occur in clear air, clouds or precipitation, is responsible for a

number of fatal aviation accidents. Microbursts, the most dangerous form of windshear, are particularly hazardous to landing or departing aircraft.

This is the 10th year of a multiyear program to provide hazardous weather alerts in the terminal area. The FAA has procured 47 TDWR systems (45 operational and 2 support systems). By the end of FY1998, all but seven TDWR's will have been commissioned, and they should be commissioned by July 2000.

chanical concern that has caused several outages on commissioned systems.

- 47 TDWR Systems (including two support systems)
- TDWR processor replacements.

- Commissioned 16 TDWR systems.

- ARW-1, Air Traffic System Requirements Service, Aviation Weather Directorate.

- AND-400, IPT for Surveillance/Weather.

- Raytheon Corporation
Sudbury, Mass.

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
<ul style="list-style-type: none"> MNS 268 Approved 3/87 Contract Award 11/88 																			
TDWR <ul style="list-style-type: none"> First Site ORD 																			
				<ul style="list-style-type: none"> 40th Site ORD Completed New York Environmental Impact Statement <ul style="list-style-type: none"> 45th Site ORD 															
				TDWR Product Improvements <ul style="list-style-type: none"> Begin Improvements <ul style="list-style-type: none"> End Improvements 															

Program Description: Air traffic controllers in the en route environment currently obtain weather radar information from the long-range surveillance radars, which are not well suited for this purpose. Next generation weather radars (NEXRAD) will replace long-range surveillance radars as the source of weather data.

pretation is required, which can be time consuming and inefficient.

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will greatly enhance their ability to analyze rapidly changing, potentially hazardous weather conditions.

Development and deployment will occur in three stages. The initial stage, Stage 0, leases commercial hardware/software components to replace the Meteorological Weather Processor. Stage 1/2 will be an FAA-owned system that will be upgraded to receive and process NEXRAD data, and distribute it to controller consoles via DSR. Stage 3 implements upgraded National Weather Service (NWS) gridded model data algorithms, enabling WARP to “ingest” higher resolutions, and develops additional NAS interfaces for cost-effective weather data sharing. This facilitates a common situational awareness within the en route environment. Stage 3 also leverages the FAA's investment in aviation weather research to develop those upgraded algorithms, providing enhanced weather displays to controllers via DSR and to CWSU meteorologists.

Products:

- Stage 0: 23 leased WARP systems

- Stage 1/2: 24 FAA-owned WARP systems displaying NEXRAD data to controllers via DSR
- Stage 3: Implementation of upgraded NWS gridded weather products and development of NAS interfaces for cost-effective weather data sharing.

Accomplishments (1/97–9/98):

- Completed Stage 0 test readiness review and system testing
- Fielded Stage 0 system ahead of schedule
- Baselined Stage 1/2 software design.

Sponsor Organization:

- ARW-1, Air Traffic System Requirements Service, Aviation Weather Directorate.

Performing Organization:

- AUA-400, IPT for Weather and Flight Service Systems, Air Traffic Systems Development.

Contractors:

- Harris Corporation
Melbourne, Fla.

Schedule: W04 - Weather and Radar Processor (WARP)

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
	• MNS 043 Approved			• KDP-3 Approved		• Contract Award													
						• Stage 0 IOC													
						• Stage 0 First ORD													
						• Stage 0 Last ORD													
							• Stage 1/2 IOC												
								• Stage 1/2 First ORD											
								• Stage 1/2 Last ORD											
								• Begin Stage 3—Advanced Weather Product Implementation											
													• Complete Weather Product Implementation						
													• F&E Program Ends						

W05—Low-Level Windshear Alert System (LLWAS)

Program Description: LLWAS provides real-time detection algorithms and notification of hazardous weather events (microbursts and windshear) in the terminal area at 110 airports. The system's sensors are most effective in open spaces because obstacles like trees and buildings degrade sensor accuracy, which results in false readings. LLWAS sensors at many airports need to be relocated in order to provide accurate windshear information. Also, the system's

hardware and software are obsolete and extremely difficult to support.

This program consists of three distinct efforts:

LLWAS Network Expansion. Expanding the LLWAS network at nine airports will upgrade systems by improving detection algorithms and modifying microburst and windshear alert displays. Weather information will be presented in a runway-oriented format and the number of weather sensors increased.

This network expansion also provides interfaces to Terminal Doppler Weather Radar (TDWR) and remote maintenance monitoring equipment.

LLWAS Sustainment. This project will sustain sensors at 39 sites, replacing aging electronics, reducing support costs, and extending the service life by 15 years. The effort will also incorporate remote maintenance monitoring equipment.

LLWAS Relocation. This project will relocate weather sensors at selected airports to restore LLWAS detection effectiveness. The effort provides a national contract to acquire sensor poles and provides funding and technical support for regional implementation.

Products:

- Nine LLWAS's with Network Expansion configuration
- Sustain 39 LLWAS's and sensors
- Interfaces for Terminal Doppler Weather Radar and remote maintenance monitoring equipment
- Relocation of LLWAS sensors as required

- Replacement of aging electronics and sensors.

Accomplishments (1/97–9/98):

- Upgraded LLWAS to Network Expansion configuration at Chicago and Dallas-Fort Worth airports
- Initiated acquisition of land to install LLWAS at LaGuardia Airport
- Awarded LLWAS Relocation and Support contract to replace LLWAS-2 equipment at 39 airports.

Sponsor Organization:

- ARW-1, Air Traffic System Requirements Service, Aviation Weather Directorate.

Performing Organization:

- AND-420, Windshear Products Team, IPT for Surveillance/Weather.

Contractors:

- Climatronics
Long Island, N.Y.

Schedule: W05 - Low-Level Windshear Alert System (LLWAS)

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
	• MNS 015 Approved																		
					LLWAS Network Expansion														
					• First Site IOC														
									• Last Site ORD										
					LLWAS Sustainment														
					• Contract Award														
									• Second Contract Award										
									• Deployment Decision										
									• First Site Installation										
										• Last Site Installation - (39 sites)									
										• Begin Additional Installations									
														• End Additional Installations					
					LLWAS Relocation														
					• Completed Site Surveys														
					• Contract Award for Sensor Poles														
					• Began Relocation Construction														
									• Complete Relocation										
									• F&E Program Ends										

W06–Digital Altimeter Setting Indicator (DASI) Replacement

Program Description: An accurate altimeter setting is essential for pilots to maintain their assigned altitude, in order to maintain vertical separation between their aircraft and terrain or obstructions. The existing

digital altimeter setting indicator (DASI) atmospheric pressure displays used in control towers and TRACON's are old and must be replaced with new devices when they fail.

This program acquired commercially available indicators that display atmospheric pressure in a digital format. It replaced 175 obsolete indicators from several different vendors with units manufactured by a single vendor. Procurement of an additional 300 units is planned in 2000. When this project is completed, all FAA DASI systems will be from a single manufacturer, greatly simplifying logistics support, maintenance, and training.

Products:

Initial Buy

- 175 DASI systems.

Second Buy

- 300 DASI systems.

Accomplishments (1/97–9/98):

Initial Buy

- Delivered last DASI system in May 1997
- Held last program review in March 1997
- Initial DASI contract is closed out.

Second Buy

- Planned for 2000.

Sponsor Organization:

- ARW-1, Air Traffic System Requirements Service, Aviation Weather Directorate.

Performing Organization:

- AUA-430, Weather Sensors Product Team, IPT for Weather and Flight Service Systems.

Contractors:

- DME Corporation
Fort Lauderdale, Fla.

Schedule: W06 - Digital Altimeter Setting Indicator (DASI) Replacement

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
	• MNS 016 Approved																		
				DASI Initial Buy - 175 Systems															
				• Contract Award															
				• First Delivery															
						• Last Delivery													
									DASI Second Buy - 300 Systems										
									• Obtain Contract for Additional Units										
									• Last Delivery										

W07–Integrated Terminal Weather System (ITWS)

Program Description: Weather is responsible for 65 percent of all delays and causes 40 percent of accidents. Air traffic personnel in tower cabs and Terminal Radar Approach Control (TRACON) facilities rely on several terminal area weather sensors to provide weather data. Data interpretation is performed manually and is labor intensive, and data from the various sensors may be conflicting.

The main shortcoming of the present system is the lack of a weather processor that integrates these data and provides predictions of short-term weather changes, such as windshear, microbursts, thunderstorms, ceiling, and visibility that affect safety, capacity, and efficiency in the terminal area. Conse-

quently, air traffic management cannot make the most efficient use of terminal airspace resources.

The Integrated Terminal Weather System (ITWS) will provide graphic and text displays that characterize the current terminal weather situation to service providers and users, as well as provide near-term (approximately 30-minute) forecasts for the terminal area. Products generated by ITWS include windshear and microburst predictions, storm cell and lightning information, gust front movement, and terminal area winds aloft. The preplanned product improvement products include storm growth and decay, and terminal area ceiling and visibility predictions.

The ATCSCC will likely receive ITWS SD's to monitor weather at the major hubs. An ITWS will also be installed at each of the following locations: FAA Academy, FAA Technical Center, and ITWS Program Support Facility. Some data will also be made available to airlines. Prototype systems are currently located at Memphis, Tenn.; Orlando, Fla.; and Dallas-Ft. Worth, Tex. A fourth prototype has been procured by the New York/New Jersey Port Authority for the New York area.

- 37 ITWS product generators

- Accomplishments (1/97–9/98):**

- Awarded full-scale development contract to Raytheon Corporation in January 1997
- Completed critical design review in September 1998.

- ARW-1, Air Traffic System Requirements Service, Aviation Weather Directorate.

- AUA-400, IPT for Weather and Flight Service Systems, Air Traffic Systems Development.

- Raytheon Corporation
Sudbury, Mass.

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
	• MNS 234 Approved				• KDP-3 Approval		• Contract Award		• Critical Design Review Completed		• Deployment Decision								
										• First Article		• First Site ORD							
												• Last Site ORD							
										Preplanned Product Improvements - P³I									
										• Begin P ³ I							• End P ³ I		

This is the fifth year of a multiyear program to provide warnings of hazardous weather at airports that do not warrant a TDWR. This program was initiated in response to National Transportation Safety Board

The ASR-9 weather channel is modified by adding a modular data processing unit that detects hazardous windshear and microburst events near airport runways. The unit also detects and predicts the arrival of gust fronts and detects storm cells. The unit and associated algorithms have been implemented on a production radar and demonstrated during tests con-

ducted at Kansas City, Mo.; Orlando, Fla.; and Albuquerque, N. Mex.

Products:

- 37 Weather Systems Processors (34 operational and 3 support systems)

Accomplishments (1/97–9/98):

- Obtained approval of system specification
- Upgraded Albuquerque, N. Mex., test installation to Phase 2 demonstration system
- Initiated continuous operation of Phase 2 demonstration system

- Awarded prime mission equipment contract.

Sponsor Organization:

- ARW-1, Air Traffic System Requirements Service, Aviation Weather Directorate.

Performing Organization:

- AND-420, Wind Shear Products Team, IPT for Surveillance.

Contractors:

- Northrop Grumman
Baltimore, Md.

Schedule: W09 - Airport Surveillance Radar Weather Systems Processor (ASR-WSP)

91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10
	• MNS 313 Approved				• MNS 313 Revalidation Approved														
						Weather System Processor													
						• JRC Investment Decision													
						• Issued Initial Screening Information Request													
						• Production Contract Award													
										• First Site ORD									
										• Last Site ORD									

New Weather Mission Needs (2001–2004)

New weather mission needs expected to be funded in the next 5 years include sustaining and enhancing or replacing the weather message switching center replacement (WMSCR), which processes critical

weather and NOTAM information. Actual requirements will be addressed through the Acquisition Management System.

